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Assessment of Antibiotic Prescribing Pattern Using World Health Organization Prescribing Indicators in a Tertiary Care Hospital, Gujarat

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ABSTRACT
Background: *In order to promote rational drug use of antibiotics in developing countries, assessment of antibiotic use pattern using the World Health Organization drug use indicators is important. . Inappropriate prescribing habits lead to ineffective and unsafe treatment, worsening of disease and increment of health care costs. The aim of this study was to assess the drug prescription patterns at tertiary Hospital, Gujarat using some of the World Health Organization core drug use indicators.*
Methods*: A prospective cross-sectional study was carried out in order to determine current prescribing trends at tertiary care hospital, Gujarat. A total of 2506 prescriptions were collected and analyzed in the study.*
Results and Discussion*: A total of 5157 antibiotics were prescribed from 2506 patient encounters. The average number of drugs per encounter was 9.4. The percentage of encounters in which an antibiotics was 2. Levofloxacin (28.4%) followed by ceftriaxone (15.3%) and Amoxicillin (9.9%) were the most commonly prescribed antibiotics. The percentage of drugs prescribed from essential drugs list and by Generic name was 84.8 % and 3 %, respectively. Rate of antibiotics prescribing showed deviation from the standard recommended by World Health Organization whereas Polypharmacy and uses of brand names to be a significant problem found during study.*
Conclusion: *Interventions aimed at improving the antibiotic prescribing patterns need to be implemented so as to prevent the inappropriate use of antibiotics and avoid further complications.*
KEYWORDS: *Drug prescription; prescribing practices; rational drug use; WHO prescribing indicators*

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I. INTRODUCTION

Antibiotics play a pivotal role in combating disease and maintaining health especially in developing countries where infectious diseases are still a big challenge. Antimicrobial agents account for 20-50% of total hospital spending on drugs. Currently, Antibiotics are the most commonly prescribed drugs in hospitals worldwide. Antibiotics are medications that can destroy or inhibit the growth of bacteria by either selectively killing or inhibiting the development of disease-causing bacteria.[1, 2]

Rational use of medicines is observed when patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest price.[3, 4, 5,6,14]In 1985, WHO conducted an international conference on rational drug usage at Nairobi to develop guidelines for rational usage of drugs.[5, 18]

The most common causes of irrational medicine use are; self-medication, polypharmacy, inappropriate use of antibiotics, overuse of injectable medicines and the prescribing of medicines without following relevant clinical practice guidelines.[2,4,6]

One of the core policies to promote rational drug use is the supervision, audit and feedback.[7] Prescription audit and feedback consists of the analysis of prescription for appropriateness and then giving feedback. Evaluation of drug use patterns with WHO drug use indicators is an obligatory step for promoting rational use of drugs. In order to encourage rational drug use, it is necessary to find out and describe the various ways in which the drug use is irrational like the Polypharmacy, overuse of antibiotics and injectable drugs.[3, 4, 8,13]

The World Health Organization (WHO) core indicators help to improve the prescribing patterns and thus promote the rational use of drugs in a healthcare facility. It is needed to assess the rational prescribing skill of the clinicians, and this can be done by conducting periodic prescription audit.[3,7,16]This study described the drug prescribing pattern in the tertiary care hospital, Gujarat.

II. MATERIALS AND METHODS

This prospective cross sectional study was conducted at medicine ward with 3 hospitals to asses prescribing pattern of antibiotics. Inpatient prescription data were collected by random sampling techniques from March 2019 to February 2020. A total of 2506prescriptions were collected and evaluated as per WHO guideline on prescribing indicators. Information were obtained including patient sex, age and diagnosis, and the prescribed items related information such as medicines and the dosage forms. The prescriptions collected belonged to Medicine department.

WHO prescribing indicators were used in the current study. It includes

- Drug/Prescription,
- Antibiotic prescribed/prescription,
- Antibiotic prescribed by generic name**,**
- Antibiotic prescribed by brand name,
- Fixed Dose Combination of antibiotic,
- Antibiotic prescribed from NLEM,
- Switch over therapy from parenteral to oral route,

The average number of medicines per prescription was calculated by assuming each medicine as an individual item, also the same generic drug in different dosage forms were taken as individual medicines.

An approval from the Institutional Review Committee of K.B Institute of Pharmaceutical Education & Research, Gandhinagar, Gujarat was obtained prior to the study. Data collection form was prepared by using WHO designed criteria based data collection format. The specific type of data required to measure the prescribing indicators was recorded for every patient encountered and entered directly into a computer in Microsoft Office Excel. The study data were analyzed by using parameters such as average and percentages.

III. RESULTS

Demographic data of patients (age and sex) as well as date of prescription were mentioned in all reviewed patient file. However, none of the patient file contained patient weight and height data. Drug-related information, such as name of the drug, strength, frequency and duration of treatment were completely mentioned in all of the prescriptions reviewed. The diagnosis of ailments was recorded in all of the prescription papers.

As shown in Table 1, the majority of the prescriptions (66.1%), were prescribed for males. Majority of the patients were between the ages of 21 to 30 years (25.4%). A total of 5157 antibiotics were prescribed with an average number of drugs per encounter found to be 2for 2506 patients. Out of all prescriptions, 1042 (41.6%) of them had only 1 antibiotic per prescription while 6 prescriptions contained 6 (0.2%) antibiotics (Table 2).

Table 1. Sociodemographic Characteristics of Sampled Patients at Hospital Inpatient medicine Department

Characteristics		
Gender	**Frequency**	**Percentage**
Male	1657	66.1
Female	849	33.9
Age Range		
21 - 30	636	25.4
31 - 40	541	21.6
41 - 50	458	18.3
51 - 60	496	19.8
61 - 70	375	15

Table 2. Summary Report of Number of Drugs per Encounter at Hospital Inpatient medicine Department

No of antibiotic drugs/ prescription	**No of Prescription**	**Percentage**
1	1042	41.6
2	572	22.8
3	663	26.5
4	171	6.8

5	52	2.1
6	6	0.2

About 84.8% of the drugs, were prescribed from the National list of essential medicine. The details are shown in Table 3. By antibiotics category, Fluroquinolones was the most frequently prescribed (1970, 38.2%) category of antibiotics followed by Cephalosporin (1017, 19.7 %) (Table no 4).

Table 3: Summary Report of Prescribing Indicators

Prescribing Indicators	**Frequency**
Average Drug/ Prescription	9.4
Average Antibiotic Prescribed/ Prescription	2
Antibiotic prescribed by generic name	157(3%)
Antibiotic prescribed by brand name	5000(97%)
Fixed Dose of Combination	782(15.2%)
Antibiotic Prescribed from NLEM	4375(84.8%)
Switch Over Therapy parenteral to oral route	474

Table 4:Most Commonly Prescribed Class of antibiotics

Drug Class	**Percentage**	**Frequency**
FLUROQUINOLONES	38.2	1970
CEPHALOSPORIN	19.7	1017
FIXED DOSE COMBINATION	15.2	782
PENICILLIN	11.8	609
MACROLIDE	5.4	275
TETRACYCLIN	3.6	183
NITROIMIDAZOLE	3.9	200
AMINOGLYCOSIDE	2.2	114
NITROFURANTOIN	0.1	7
TOTAL	100	5157

By specific types of antibiotics, Levofloxacin (1467, 28.4%) was the most frequently prescribed antibiotic, followed by ceftriaxone (791, 15.3%) and Amoxicillin (510, 9.9%) (Table no 5).
Among the 2506 prescriptions, Respiratory tract infections (1176, 46.93%) were the most common diagnosis for frequently prescribed antibiotics followed by Gastrointestinal infections (784, 31.28% (Table 6**).**

Table 5: Summary of Most Commonly Prescribed Antibiotics

DRUG NAME	**TOTAL**	**PERCENTAGE**
LEVOFLOXACIN	1467	28.4
MOXIFLOXACIN	299	5.8
CIPROFLOXACIN	198	3.8
OFLOXACIN	6	0.1
CEFTRIAXONE	791	15.3
CEFIXIME	117	2.3
CEFOTAXIME	108	2.1
CEFTRIAXONE SALBACTUM	436	8.5
CEFOPARAZONE SALBACTUM	24	0.5
PIPERACILLIN TAZOBACTUM	151	2.9
AMOXICILLIN CLAVULANICACID	159	3.1

TRIMETHOPRIM SULFAMETHAXOLE	2	0.0
CEFOTAXIME SALBACTUM	10	0.2
AMOXICILLIN	510	9.9
AMPICILLIN	74	1.4
PENICILLIN	8	0.2
PIPERACILLIN	17	0.3
DOXYCYCLIN	180	3.5
MINOCYCLIN	3	0.1
CLARITHROMYCIN	134	2.6
ERYTHROMYCIN	7	0.1
AZITHROMYCIN	137	2.7
METRONIDAZOLE	200	3.9
AMIKACIN	112	2.2
NITROFURANTOIN	7	0.1
	5157	100

Table 6: Summary of Common Diagnosis for Frequently Prescribed Antibiotics

Disease Condition	**No of prescription**	**Percentage**
Respiratory Disorder	1176	46.93
GI Disorder	784	31.28
Urinary Disorder	350	13.97
Viral Infection	196	7.82

IV. DISCUSSION

All the 2506 prescriptions contain patient information (name, age, and sex). This could be attributed to improvements in prescribing and dispensing practice by health professionals, which could in turn be due to continuous professional developments and revolutionary practices executed by the hospital and specially the pharmacy department.

The contents of a prescription are influenced by a prescribers' training, their attitude towards the disease being treated and the type of healthcare system within which they work. The results of the current study revealed that the average number of drugs per prescription were 9.4, which was the higher than the standard value 1.6 -1.8 drugs per encounter.[9] In contrast to our findings, the average number of drugs prescribed was 2.91 inUttarprades, India.[3] Higher number of drugs per prescription which could be attributed to multiple reasons. Incompetency on the part of physicians, absence of evidence-based guidelines, Polypharmacy. Having a higher number of drugs per prescription can adversely influence treatment outcomes as patients are more likely to be non-compliant and are at greater risk of interactions and adverse events.

In this study the most common indications for antibiotic prescription was respiratory tract infections (46.93 %) followed by gastrointestinal tract infections (28%). This result was consistent similar with a study conducted in University of Gondar, Ethiopia and Bangalore , India.[1,2] This could be due to the fact that respiratory tract infections such as tonsillitis and pharyngitis, which usually occur due to problems in personal hygiene, are very common in India and antibiotics are the mainstream treatment, which makes them being frequently prescribed.

The percentage of drugs prescribed by generic name was 3 % in our study. Which was much lower than the standard value (100%).[9] This low rate of generic name prescribing has been observed in many other studies from India.[2, 3, 7]In Ethiopia a similar study reported that 96 % drugs were prescribed by generic name.[1] This may be due to differences in the 2 countries' medication procurement policy in which the Ethiopian procurement policy promotes procurement by generic name or it could be due to economical differences between the people in the 2 countries. Sometimes, the prescribing behavior of doctors is influenced by medical representatives of pharmaceutical companies, and this may lead to increase in drug prescription by brand names. The generic prescribing would rationalize the use of drugs and reduce the healthcare cost.

In this study, Fluroquinolones were the most frequently prescribed class of antibiotics (38.2%) followed by Cephalosporin (19.7%). A study conducted in Ethiopia, reported that penicillin (38.5%) were the most frequently prescribed groups of antibiotics followed by macrolide (15%).[1]By specific antibiotics, levofloxacin (28.4%) followed by ceftriaxone (15.3 %) and amoxicillin (9.9 %) were the most frequently prescribed antibiotics in the current study. This finding was different with study conducted in university of Gondar, Ethiopia , in which amoxicillin (28.5%) followed by ciprofloxacin (12 %) being the most frequently prescribed antibiotics.[1,14] Amoxicillin followed by ampicillin was also found to be among the commonly prescribed antibiotics in studies conducted in a referral hospital in Ethiopia and Brazil. [10,19]But, this was different from a study done in Bangalore, India, in which ceftriaxone was the most frequently prescribed antibiotics.[2] This might be due to regional variation in bacterial susceptibility/resistance, prescribing habit and the difference in prevalence of infectious diseases in different countries.[11,12]

In this study the percentage of drugs prescribed from the essential drugs list was 84.8 %, which was not far from the ideal value of (100%) set by WHO. This figure was 22.57% study done in Uttarprades, India.[3]Values nearto 80% have been reported from Himachalprades, rural area of Uttar Pradesh, Rohtak, India and ethoipia**.**[7,10,15,17]The current finding showed good prescribing practice and it could be due to a strict follow-up by the hospital management and/or it could be due to the pharmaceutical procurement policy, which is based on the Essential Drugs List of the country and this limits prescribers not to prescribe drugs out of the list because only drugs from the Essential Drugs List are available in the health care facility.

V. CONCLUSION

Based on the finding of this study, the prescribing practices for antibiotic and drugs by generic names show deviation from the standard recommended by WHO. Prescribing from NLEM were not found to be a problem in this study. While the average number of drugs per prescription was found high. There is a need to improve the standard of prescription. This can be achieved by educating and updating clinicians through CME, seminar, by providing them standard treatment guidelines, essential drug list and antibiotic policy. .

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ETHICAL CLEARANCE

Ethical approval has been taken from ethics Committee of K.B institute of pharmaceutical education and research Gandhinagar.

CONFLICTS OF INTEREST

No.

ABBREVIATIONS

NLEM - National list of Essential Medicine
FDC - fixed- dose combinations
WHO - World Health Organization

REFERENCES

[1]. Yimenu D, Emam A, Elemineh E, Atalay W. Assessment of Antibiotic Prescribing Patterns at Outpatient Pharmacy Using World Health Organization Prescribing Indicators. Journal of Primary Care & Community Health. 2019; 10:1-8.
[2]. Shahbazi Nia S, Hiremath SRR, Prasad S. Assessment of Antimicrobial Use Pattern Using World Health Organization Prescribing Indicators at a Tertiary Hospital: A Prospective, Observational study. J App Pharm Sci, 2018; 8(06): 132-138.
[3]. Hussain S, Yadav SS, Sawlani KK, Khattri S. Assessment of drug prescribing pattern using world health organization indicators in a tertiary care teaching hospital. Indian J Public Health 2018; 62:156- 8.
[4]. Bilal A, Osman E, Mulugeta A. Assessment of medicines use pattern using World Health Organization's Prescribing, Patient Care and Health facility indicators in selected health facilities in eastern Ethiopia. BMC Health Services Research. 2016; 16(1).
[5]. Prasad P, Rudra J, Vasanthi P, Sushitha U, Sadiq M, Narayana G. Assessment of drug use pattern using World Health Organization core drug use indicators at Secondary Care Referral Hospital of South India. CHRISMED Journal of Health and Research. 2015; 2(3):223-228.
[6]. Worku F, Tewahido D. Retrospective Assessment of Antibiotics Prescribing at Public Primary Healthcare Facilities in Addis Ababa, Ethiopia. Interdisciplinary Perspectives on Infectious Diseases. 2018; 2018:1-9.
[7]. Singh, MD R. Prescription audit and assessment of drug use pattern using World Health Organization prescribing indicators in a tertiary care teaching and referral hospital in Himachal Pradesh, India. Journal of Medical Science And clinical Research. 2018; 6(9).
[8]. Atif M, Azeem M, Sarwar M, Shahid S, Javaid S, Ikram H et al. WHO/INRUD prescribing indicators and prescribing trends of antibiotics in the Accident and Emergency Department of Bahawal Victoria Hospital, Pakistan. SpringerPlus. 2016; 5(1).

[9]. Isah A, Laing R, Quick J, Mabadeje A, Santoso B, Hogerzeil H et al. The Development of Reference Values for the WHO Health Facility Core Prescribing Indicators. West African Journal of Pharmacology and Drug Research. 2001; 18(1).
[10]. Getachew E. Antibiotic prescribing pattern in a referral hospital in Ethiopia. African Journal of Pharmacy and Pharmacology. 2013; 7(38):2657-2661.
[11]. WHO methodology for a global programme on surveillance of antimicrobial consumption: version 1.0: World Health Organization [Last accessed on 2020 July 19, 2020]
[12]. World Health Organization. How to Investigate Drug use in Health Facilities: Selected Drug use Indicators. WHO/DAP. Vol. 1. Geneva: World Health Organization; 1993. p. 1‑87
[13]. Shrestha B, Dixit S. Assessment of Drug Use Pattern Using WHO Prescribing Indicators. Journal of Nepal Health Research Council. 2018; 16(3):279-284.
[14]. Berha A, Seyoum N. Evaluation of drug prescription pattern using world health organization prescribing indicators in tikuranbessa specialized hospital: A cross–sectional study. Journal of Drug Delivery and Therapeutics. 2018; 8(1).
[15]. Pathak A, Gupta V, Maurya A, Kumar A, Singh A. Assessment of drug prescribing pattern using WHO indicators in hospitalized patients at a tertiary care teaching hospital in rural area of India. International Journal of Basic and Clinical Pharmacology. 2016;:651-655
[16]. Summoro T, Gidebo K, Kanche Z, Woticha E. Evaluation of trends of drug-prescribing patterns based on WHO prescribing indicators at outpatient departments of four hospitals in southern Ethiopia. Drug Design, Development and Therapy. 2015; 4551-4557.
[17]. Mittal N, Mittal R, Singh I, Nusarat S, Malhotra S. Drug utilization study in a tertiary care center: recommendation for improving hospital drug dispensing policies. Indian journal of pharmaceutical sciences. 2014:76(4):308-314
[18]. Desalegn A. Assessment of drug use pattern using WHO prescribing indicators at Hawassa University teaching and referral hospital, south Ethiopia: a cross-sectional study. BMC Health Services Research. 2013; 13(1).
[19]. Ferreira M, Heineck I, Flores L, Camargo A, Dal Pizzol T, Torres I et al. Rational use of medicines: prescribing indicators at different levels of health care. Brazilian Journal of Pharmaceutical Sciences. 2013; 49(2):329-340.
[20]. Chandelkar U, Rataboli P. A study of drug prescribing pattern using WHO prescribing indicators in the state of Goa, India. International Journal of Basic & Clinical Pharmacology. 2014:1057-61.

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